

CLAIMS

1. A magnetic head, comprising:
first and second pole pieces;
5 a write gap between the first and the second pole pieces; and
a heating element formed in the magnetic head which produces heat at an air bearing surface (ABS) for thermally bonding lubricant over at least a portion of a surface of a magnetic disk.
- 10 2. The magnetic head of claim 1, further comprising:
electrical conductors coupled to the heating element.
3. The magnetic head of claim 1, further comprising:
electrical conductors coupled to the heating element; and
15 the electrical conductors for carrying an electrical current through the heating element for producing the heat.
4. The magnetic head of claim 1, further comprising:
electrical conductors; and
20 the electrical conductors coupled to the heating element and a heater driver circuit for driving the heating element for producing the heat.
5. The magnetic head of claim 1, further comprising:
wherein the first and the second pole pieces are used for writing data to the
25 magnetic disk during a write mode of operation; and
wherein the heating element is for producing heat outside of the write mode of operation.

6. A method of thermally bonding lubricant over a magnetic disk in a disk drive, comprising:

providing a heating element in a magnetic head; and

controlling the magnetic head to move over at least a portion of a surface of a magnetic disk while the heating element is energized so that lubricant is thermally bonded to the at least portion of the surface of the magnetic disk.

7. The method of claim 6, further comprising:

providing a driver circuit which is coupled to the heating element; and

wherein the act of controlling the magnetic head comprises energizing the heating element with the driver circuit.

8. The method of claim 6, further comprising:

wherein the act of controlling the magnetic head comprises moving the magnetic head over the at least portion of the surface comprising at least one disk track.

9. The method of claim 6, further comprising:

wherein the act of controlling the magnetic head comprises repeated moving the magnetic head over the at least portion of the surface so that the lubricant is thermally bonded to the at least portion of the surface.

10. The method of claim 6, wherein the heating element is energized to produce heat at a temperature of between 25 - 250° Celsius.

11. The method of claim 6, wherein the heating element is energized to have a power dissipation of between 10 – 140 milliwatts.

12. A method of operating a disk drive which includes one or more magnetic heads having a heat source at an air bearing surface (ABS), comprising:

causing the disk drive to operate in a write mode of operation during which the magnetic head writes data to a magnetic disk and the heat source produces heat to assist in the writing of the data; and

causing the disk drive to operate in a lubricant bonding mode of operation during
5 which the magnetic head is moved across a surface portion of the magnetic disk to thermally bond lubricant to the surface portion from heat produced by the heat source.

13. The method of claim 12, further comprising:
providing a lubricant reservoir in the disk drive which provides the lubricant on
10 the surface of the magnetic disk.

14. The method of claim 12, wherein the lubricant bonding mode of operation is activated on a regular basis in the disk drive.

15 15. The method of claim 12, wherein the lubricant bonding mode of operation is activated on a periodic basis in the disk drive.

16. The method of claim 12, wherein the lubricant bonding mode of operation is activated in response to an expiration of a predetermined time period.
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17. The method of claim 12, wherein the lubricant bonding mode of operation is activated in response to a predetermined temperature or humidity condition.

18. The method of claim 12, wherein the lubricant bonding mode of operation
25 is activated in response to a predetermined signal.

19. The method of claim 12, wherein a driver circuit is utilized to energize the heat source to produce heat.

20. A magnetic head, comprising:
a write head;
a heat source at an air bearing surface (ABS) of the write head;
the heat source being operative as:
5 a thermal-assist heat source for use in writing data to a magnetic disk; and
a lubricant bonding heat source for use in thermally bonding lubricant to a
surface of the magnetic disk.
21. The magnetic head assembly of claim 20, further comprising:
10 first and second pole pieces of the write head; and
the heat source being formed adjacent to at least one of the first and the second
pole pieces.
22. The magnetic head assembly of claim 20, wherein the heat source is
15 coupled to a driver circuit.
23. The magnetic head assembly of claim 20, wherein the lubricant is from a
lubricant reservoir.
- 20 24. The magnetic head assembly of claim 20, wherein the heat source
comprises a resistive element.
25. A disk drive having:
a write mode of operation during which a driver circuit operates to energize a heat
25 source of a write head to heat a surface portion of a magnetic disk and a processor
operates to control the position of the write head for writing data to the surface portion of
the magnetic disk; and
a lubricant bonding mode of operation during which the driver circuit operates to
energize the heat source to heat a surface portion of the magnetic disk and the processor

operates to control the position of the magnetic head assembly for thermally bonding lubricant to the surface portion of the magnetic disk from heat produced by the heat source.

5 26. The disk drive of claim 25, further comprising:
first and second pole pieces of the write head; and
wherein the lubricant bonding heat source comprises a separate element from the first and the second pole pieces.

10 27. The disk drive of the claim 25, wherein the heat source is formed on or within the write head.

 28. The disk drive of claim 25, further comprising:
a lubricant reservoir which provides the lubricant on the surface of the magnetic
15 disk.

 29. The disk drive of claim 25, wherein the lubricant bonding mode of operation and the write mode of operation are mutually exclusive modes of operation.

20 30. The disk drive of claim 25, wherein the processor is operative to activate the lubricant mode of operation of the disk drive on a regular basis.

 31. The disk drive of claim 25, wherein the processor is operative to activate the lubricant mode of operation of the disk drive on a periodic basis.

25 32. The disk drive of claim 25, further comprising:
an environmental condition sensor; and
wherein the processor is operative to activate the lubricant mode of operation of the disk drive based on signals from the environmental condition sensor.

33. The disk drive of claim 25, wherein the processor is operative to activate the lubricant mode of operation of the disk drive based on a predetermined temperature or humidity condition.

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